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(54) Rearview mirror control device for a motor vehicle.

(57) A rear-view mirror system for a motor vehicle comprises a mirror housing (10), a reflective member mounted in the housing, electrically operated drive means (12, 14) for varying the orientation of the reflective member, a position sensor (16, 18) for producing a signal indicating the actual position of the reflective member, and a data processor (20) comprising means for storing a value indicating a pre-selected orientation for the reflective member and means for comparing said value with the signal from the position sensor (16, 18) and producing a control signal for the drive means (12, 14). The data processor (20, 40) includes a decoder and is located in the housing and is connected to an encoder (76) at a central location, the encoder being arranged to send a multiplicity of data signals to the processor (20) on a common data transmission line.

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## REARVIEW MIRROR FOR A MOTOR VEHICLE

This invention relates to a rear-view mirror system for a motor vehicle comprising a mirror housing, a reflective member mounted in the housing, electrically operated drive means for varying the orientation of the reflective member, a position sensor for producing a signal indicating the actual position of the reflective member, and a data processor comprising means for storing a value indicating a pre-selected orientation for the reflective member and means for comparing said value with the signal from the position sensor and producing a control signal for the drive means.

Patent Specification EP-A-0230203 discloses a system of this type in which electrical signals indicating the position of a controlled member are sent to a computer at a central location on the vehicle which compares these signals with the corresponding values which would be obtained if the controlled member was at a desired position and which can be actuated to generate control signals which cause the drive means to drive the controlled member to such desired position. Consequently, sufficient data must be transmitted from the location of the controlled member to the centrally located computer to indicate the position of the controlled member to the accuracy with which its position is to be set. The object of the present invention is to reduce the amount of data which has to be transmitted.

According to the invention, in a rear-view mirror system of the foregoing type, the data processor includes a decoder and is located in the housing and is connected to an encoder at a central location, the encoder being arranged to send a multiplicity of data signals to the processor on a common data transmission line.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawing, in which:

Figure 1 is a block diagram of a control system for the interior mirror and the left-hand and right-hand door mirrors of a motor car; and

Figure 2 is a schematic diagram of a switching matrix for the system shown in Figure 1.

In this embodiment of the invention, the two door mirrors are of the type in which electric motors are arranged to vary the orientation of the reflective member relative to the housing. However, the invention could equally be applied to mirrors in which electric motors are arranged to vary the orientation of the entire housing relative to the vehicle body.

Referring to Figure 1, the housing 10 of the left-hand door mirror encloses two electric motors 12 and 14 arranged to vary the orientation of the

reflective member (not shown) about horizontal and vertical axis respectively. Each of the motors 12 and 14 is also coupled to drive a respective potentiometer 16, 18 which is arranged to provide an analogue voltage indicating the orientation of the reflective member about the corresponding axis. The two potentiometers 16 and 18 are connected to respective analogue inputs of a processor 20, the processor 20 also has first and second power outputs which can supply energising voltages of either polarity to the motors 12 and 14 respectively to cause rotation thereof in either direction, together with a single polarity output which is connected to a heater 22 for demisting and/or defrosting the reflective member.

The left-hand mirror 30 is similar, having two electric motors 32 and 34 coupled to respective potentiometers 36 and 38, a processor 40 and a heater 42. The interior mirror 50 also has two electric motors 52 and 54 coupled to respective potentiometers 56 and 58, and a processor 60, but it does not have a heater.

All three mirrors 10, 30 and 50 are connected by positive and negative power supply conductors 70 and 72 and a data conductor 74 to a central control unit 76 which is mounted at some central rotation in the vehicle where it is conveniently accessible to the driver. The central control unit 76 has a number of manually operable controls, namely a joystick 78 for varying the orientation of the mirrors, a three-position selector switch 80 for selecting the mirror whose orientation is to be varied in response to movement of the joystick 78, seven memory-select push-button switches 81 to 87 for controlling the setting of the orientation of the mirrors to the orientations preferred by each of seven different habitual users of the vehicle (hereinafter designated Driver A to Driver G respectively), push-button "heater on" and "heater off" switches 88 and 90 for turning the heaters 22 and 42 on and off respectively, and a push-button "store" switch 92 the purpose of which will become apparent from the following description of the manner in which the invention operates.

When it is desired to vary the orientation of the right-hand mirror 10, the selector switch 80 is set to the right-hand position. Upward and downward movement of the joystick 78 then controls the motor 12 to vary the orientation of the reflective member about its horizontal axis while leftward and rightward movement controls the motor 14 to vary the orientation of the reflective member about its vertical axis. When the required orientation is achieved, the joystick 78 is restored to its central position. The procedure can then be repeated for

the left-hand door mirror 30 with the selector switch 80 in its left-hand position, and for the interior mirror 50 with the selector switch 80 in its central position. If Driver A wishes to store these orientations as his preferred orientations, he first presses the "store" switch 70 and then presses his memory-select switch 81. Similarly, Drivers B to G can arrange to store their preferred orientations by repeating the foregoing procedure but pressing the appropriate memory-select switch 82 to 87 to store the predetermined orientations. If, subsequently, any of the seven drivers wishes to set the mirrors to the orientations which he prefers, he merely presses the appropriate one of the memory-select switches 81 to 87.

The central control unit 76 sends data signals to the data conductor 74 in accordance with the following five-bit code:

00000	no action
00001	heaters off
00010	heaters on
00011	
00100	left mirror up
00101	left mirror down
00110	left mirror left
00111	left mirror right
01000	right mirror up
01001	right mirror down
01010	right mirror left
01011	right mirror right
01100	interior mirror up
01101	interior mirror down
01110	interior mirror left
01111	interior mirror right
10000	
10001	
10010	
10011	
10100	
10101	
10110	
10111	
11000	memory A
11001	memory B
11010	memory C
11011	memory D
11100	memory E
11101	memory F
11110	memory G
11111	store

Figure 2 shows the switch matrix of the control unit 76. In the orientation illustrated, the matrix consists of four vertical conductors, each of which is associated with a respective combination of the two least significant digits of the code, and four horizontal conductors, three of which are associated with the combinations 000, 110 and 111 of

the three most significant digits of the code. The fourth horizontal conductor is selectively connectable, by the three-position switch 80 to any of three inputs associated with the combinations 001, 010 and 011 of the three most significant digits of the code. The two inputs for the combinations 100 and 101 are not used in the embodiment illustrated.

The appropriate code signal is applied to the conductor 74 (Figure 1) when one of the vertical conductors of the matrix is connected to one of the horizontal conductors. If a second pair of conductors is so connected before the pair has been disconnected, the code of the first connected pair continues to be sent. Each of the switches 81 to 90 is connected between the appropriate pair of conductors. "Up", "down", "left" and "right" movements of the joystick 78 is arranged to cause actuation of a respective one of four further switches 94, 95, 96 and 97 which connect respective vertical conductors to the three-position switch 80.

Each of the processors 10 and 30 in the mirror housings detects all of the control signals and, in response to the appropriate signals, controls operation of the two motors and the heater therein. The relevant action continues until the code from the central control unit 76 changes.

As a precaution against inadvertent storage of an undesired value, the code 11111 produced by the "store" switch 92 is preferably arranged to disable the various motors until after another code (except 00000) has been received. Any such following code not beginning with the digits 11 is treated as invalid and cancels the store operation. If the following code is in the range 11000 to 11110, the current settings are stored in the appropriate section of the memories in the three mirrors 10, 30 and 50. If the following code is 11111 (because the "store" switch has been pressed twice), the system remains in the store mode. If the code 00000 persists for longer than, say, ten seconds after the code 11111, indicating that no further switch has been actuated, the store mode is cancelled.

## Claims

1. A rear-view mirror system for a motor vehicle comprising a mirror housing (10), a reflective member mounted in the housing, electrically operated drive means (12, 14, 32, 34) for varying the orientation of the reflective member, a position sensor (16, 18) for producing a signal indicating the actual position of the reflective member, and a data processor (20, 40) comprising means for storing a value indicating a pre-selected orientation for the reflective member and means for comparing said

value with the signal from the position sensor (16, 18) and producing a control signal for the drive means (12, 14, 32, 34), characterised in that the data processor (20, 40) includes a decoder and is located in the housing and is connected to an encoder (76) at a central location, the encoder being arranged to send a multiplicity of data signals to the processor (20, 40) on a common data transmission line.

2. A mirror system according to claim 1, wherein the data processor (20, 40) has storage means for storing a plurality of values, each of which indicates a respective preselected location, and the processor (20, 40) is arranged to respond to data signals from the encoder (76) to select one of the storage means and either to store a value corresponding to the signal from the position sensor (16, 18, 36, 38) or to compare the signal from the position sensor (16, 18, 36, 38) with a previously stored value.

3. A mirror system according to claim 1 or 2, wherein the processor (20, 40) is arranged to respond to data signals from the encoder (76) to cause the drive means (12, 14, 32, 34) to move the reflective member in a direction indicated by said data signals.

4. A mirror system according to claim 1, 2 or 3, having a plurality of mirror respective housings (10, 30), each containing a processor (20, 40) responsive to a single encoder (76).

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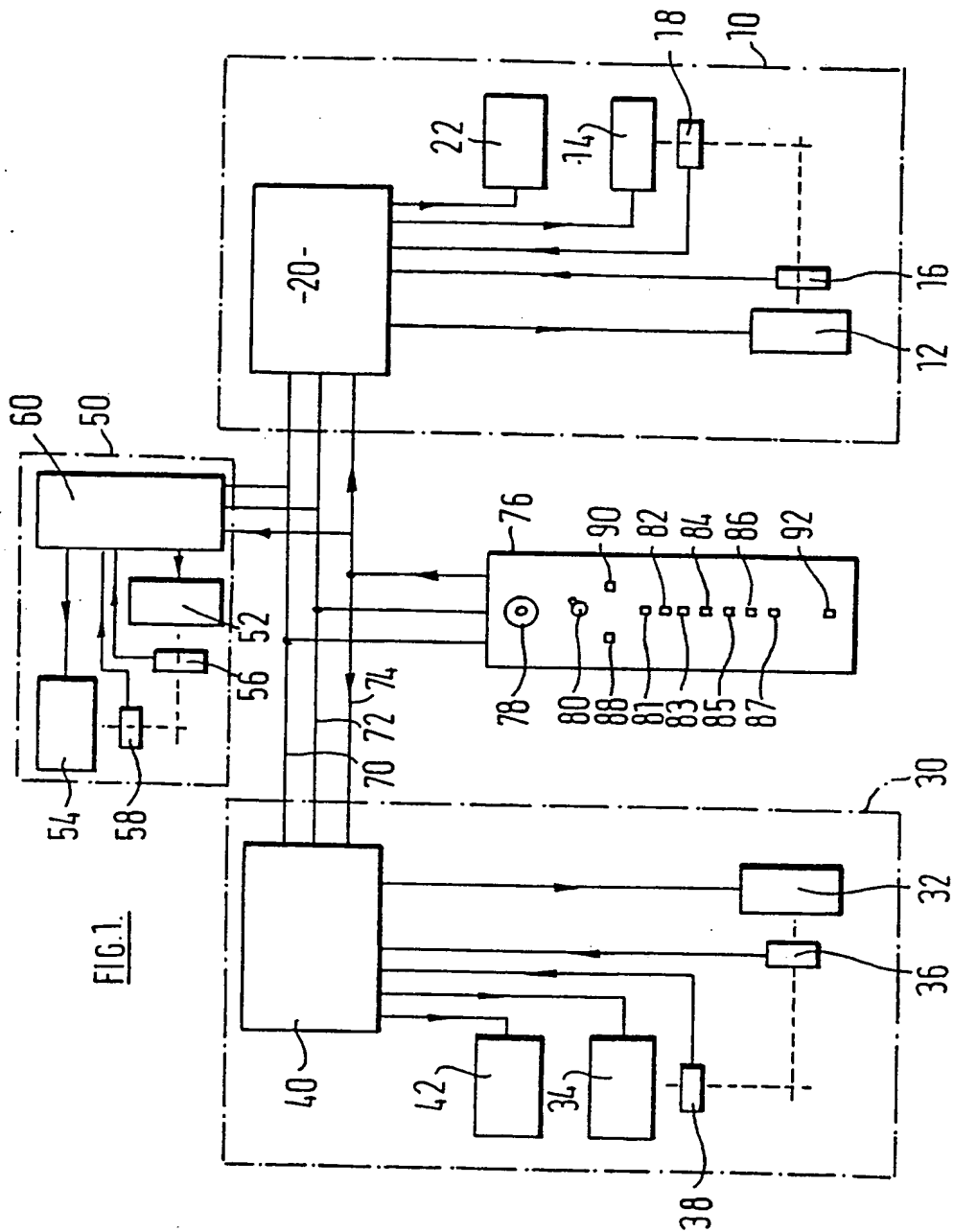
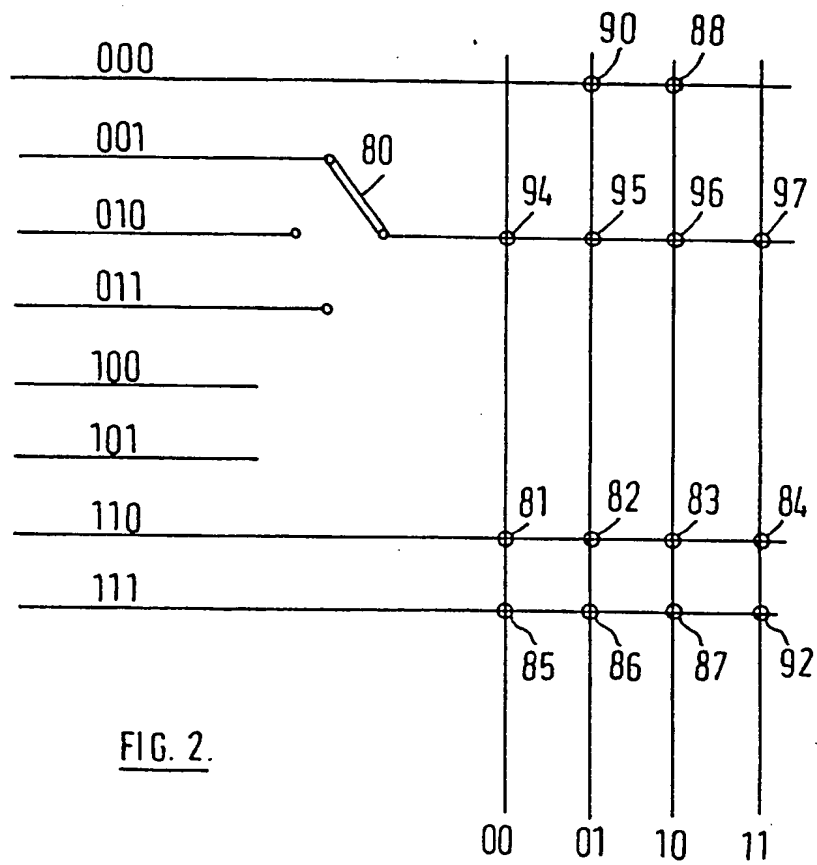


FIG. 1





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# EUROPEAN SEARCH REPORT

Application Number

EP 87 31 0594

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
Y	DE-A-3 609 695 (ALPS ELECTRIC CO.) * Claims 1-3,7; figure 1 *	1	B 60 R 1/02
A	---	2,3	
Y,A	US-A-3 864 578 (LACKEY) * Column 1, line 46 - column 2, line 15; column 4, lines 37-56; figures 1,3 *	2,3	
A	---		
A	EP-A-0 190 697 (FIAT) * Page 1, line 3 - page 2, line 29; figure 1 *	1,4	
A	---		
A	DE-A-3 311 229 (VDO AG) * Claim 1; figure 1 *	1-3	
P,A	EP-A-0 216 372 (BMW AG) * Claim 1; figure 1 *	1-4	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			B 60 R
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 22-04-1988	Examiner MAUSSER, T.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document	

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